REMARKS

Reexamination and reconsideration in light of the foregoing amendments to the claims and the following remarks is respectfully requested.

Claims 1-12, 17, 19 and 20 are pending in this application. Claims 13-16 and 18 have been canceled without prejudice or disclaimer. Claims 19 and 20 have been withdrawn from consideration due to a restriction requirement. Claim 17 has been amended to correct informal errors. Applicants appreciate the Examiner's indication of the allowability of claims 1-12.

Applicant notes the Examiner's consideration of the information cited in the Information Disclosure Statement filed March 27, 2001 as acknowledged in the Office Action Summary. Applicant further notes the Examiner's acknowledgment of Applicant's claim for foreign priority under 35 U.S.C. § 119 and receipt of the certified priority document.

Claims 13-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmour (U.S. Patent No. 5,459,107) in view of Ueno (U.S. Patent No. 6,265,326 B1). Claims 13-16 and 18 have been canceled thereby rendering the rejection as to these claims moot. With respect to claim 17, the Examiner states that "Palmour discloses depositing a silicon film 13 at the surface of the SiC substrate; [and] annealing the SiC substrate to grow the gate oxide film at the surface of the SiC substrate ...." The Examiner concedes that "Palmour does not disclose annealing in [a] water rich environment and annealing the gate oxide film in a water rich environment at a substrate temperature equal to or lower than the substrate temperature at which the gate oxide film is formed so as to reduce interface density between the gate oxide film and the SiC substrate." For this deficiency, the Examiner relies on Ueno. According to the Examiner, "Ueno discloses that to increase the rate of speed of formation of a thermal oxide film

of a silicon carbide semiconductor device, the partial pressure of water is controlled within a range of 0.1 to 1 (Figure 4)." From this finding the Examiner concludes that it would have been obvious to one having ordinary skill in the art at the time the invention was made to anneal in a water rich environment and to anneal the gate oxide film "in a water rich environment at a substrate temperature equal to or lower than the substrate temperate at which the gate oxide film is formed so as to reduce the interface density between the gate oxide film and the SiC substrate in the invention of Palmour, since as taught by Ueno, to increase the rate of speed of formation of a thermal oxide film of a silicon carbide semiconductor device, the partial pressure of water is controlled within a range of 0.1 to 0.95."

Applicant's invention is directed to method for manufacturing the SiC device capable of providing an improved gate oxide film, embracing smaller interface state densities. To that end, the claimed method comprises (i) depositing a silicon film at the surface of the SiC substrate, (ii) annealing the SiC substrate in the water rich ambient to grow the gate oxide film at the surface of the SiC substrate, and (iii) annealing said gate oxide film in a water rich ambient at substrate temperature equal to or lower than the substrate temperature at which the gate oxide film is formed so as to reduce interface density between said gate oxide film and said SiC substrate. The Examiner acknowledges that Palmour does not teach steps (ii) and (iii), *supra*.

The Examiner contends that Palmour discloses the step of depositing a silicon film 13 at the surface of the SiC substrate. Palmour does not disclose or suggest this claimed step. It is well known in the art that a silicon film cannot be epitaxially grown on the surface of the 6H-SiC. Silicon has a cubic diamond structure whereas 6H-SiC has a wurtzite structure, i.e., a hexagonal 6H polytype structure.

Epitaxy, derived from the Greek word "epi" which means on, and "taxis" which means arrangement. The term "epitaxy" describes a technique for growing a crystal by chemical reaction to form on the surface of a crystal, thin layers of semiconductor materials with lattice structures identical to those of the crystal. Column 6, lines 56-61 of Palmour states that p-type 6H epitaxial layer 12 is formed on the n-type 6H-SiC substrate 11, explaining the configuration shown in FIG.3 (a). As well known in the art, the lattice structure of silicon is a diamond structure and that the 6H-silicon structure does not exist. At column 3, line 67 to column 4, line 4, Palmour states that SiC occurs in 6H, 3C, 4H, 2H and 16R polytypes. These polytypes are differentiated by the stacking sequence of the biatom layers of the SiC structure.

The fabrication process flow shown in FIG.3 (a) to FIG.3 (b) corresponds to the method stated in claim 2 of Palmour. According to the method set forth in claim 2 of Palmour, the method comprises (i) depositing a thin boron-doped silicon carbide epitaxial layer 12 on a p-type silicon carbide portion of a device structure, (ii) forming a sacrificial layer of silicon 13 on the boron-doped epitaxial layer of silicon carbide 12, and (iii) oxidizing the sacrificial layer of silicon 13 to substantially consume the sacrificial silicon layer 13 to produce an oxide passivation layer 19 on the p-type silicon carbide portion 12 that is substantially free of dopants and other species that would otherwise degrade the electrical integrity of the oxide layer. The boron-doped silicon carbide layer 12 is thick enough to prevent aluminum in the p-type silicon carbide portion 12 of the device structure from reaching the resulting oxide, while otherwise remaining as thin as possible. The fabrication process flow stated in claim 2 exactly conforms to the description stated in column 6, line 66 to column 7, line 9, in view of FIG.3 (a) to FIG.3 (b), and the p-type 6H epitaxial layer 12 must be the p-type 6H SiC.

Because the object of the invention of Palmour is to provide a method, and resulting structures, of obtaining high quality passivation layers on silicon carbide surfaces (see column 2, lines 30-36), the p-type 6H epitaxial layer 12 on which the passivation layer 19 is formed as shown in FIG.3 (b), must be silicon carbide. Therefore, it is evident that Palmour fails to show claimed step of depositing a silicon film at the surface of the SiC substrate, and therefore the method of Palmour substantially differs from the method claimed in claim 17.

A person having ordinary skill in the art would not have been motivated to modify Palmour over the teachings of Ueno. In Ueno, there is no disclosure or suggestion of claimed step of first depositing a silicon film at the surface of the SiC substrate and then annealing the SiC substrate in the water rich ambient to grow the gate oxide film at the surface of the SiC substrate followed by annealing the gate oxide film in a water rich ambient at substrate temperature equal to or lower than the substrate temperature at which the gate oxide film is formed to reduce interface density between said gate oxide film and said SiC substrate. The proposed combination of Ueno and Palmour does not cure the deficiencies in Palmour since Ueno fail to show claimed step of depositing a silicon film at the surface of the SiC substrate.

The Examiner further concedes that Palmour and Ueno, taken alone or in combination, do not teach reducing the interface density between the gate oxide as in the present application. However, the Examiner concludes that the "recited results would be obtained because the same materials are treated in the same manner as in the instant invention." This conclusion is not understood. The Examiner has not explained what reference teaches treating the materials in the same manner. The Examiner has not explained what materials are being treated or what the same manner entails.

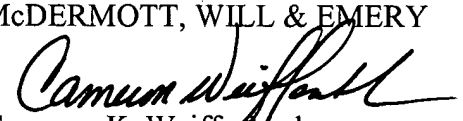
CONCLUSION

For the foregoing reasons, it is submitted that the claim 17 is patentable over the teachings of the prior art relied upon by the Examiner. Accordingly, favorable reconsideration of the claim is requested in light of the preceding amendments and remarks. Allowance of the claim is courteously solicited.

To the extent necessary, a petition for an extension of time under 37 CFR 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT, WILL & EMERY



Cameron K. Weiffenbach
Registration No. 44,488

600 13th Street, N.W.
Washington, DC 20005-3096
(202) 756-8000 CKW:jdj
Facsimile: (202) 756-8087
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